

# What embeds exclamatives and why

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LSA Annual Meeting

January 7-10, 2021

Handout available at: [tinyurl.com/exclamatives](http://tinyurl.com/exclamatives)

## 1 Introduction

Exclamative sentences, like (1-2), are typically thought to be a distinct sentence type:

- |     |                              |                        |
|-----|------------------------------|------------------------|
| (1) | How tall you are!            | <i>wh</i> -exclamative |
| (2) | Wow, are you in for a treat! | inversion exclamative  |

However, they resemble other kinds of expressions in various ways:

- Resemblance to interrogatives: Contain overt *wh*-element (1) or subj-aux inversion (2)
- Resemblance to degree expressions: Often contain a gradable predicate; English *wh*-exclamatives may only use *wh*-words which can range over degrees (Rett, 2011)
- Resemblance to facts: They seem to presuppose a proposition *p*

These properties have motivated analyses which attempt to treat exclamatives as special cases of various semantic objects:

- **Questions** (Grimshaw 1979, Gutiérrez-Rexach 1996, Zanuttini & Portner 2003, a.o.)
- **Predicates of degrees** (Rett 2008, Rett 2011)
- **Facts** (Ginzburg & Sag, 2000; Castroviejo Miró, 2006, a.o.)

We can isolate the *semantics* of exclamatives from their *conventional discourse effects*, by examining their behavior in embedded contexts (as for interrogatives, Karttunen 1977 et seq.)

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\*We thank Pranav Anand, Donka Farkas, and audiences at UCSC and Stanford for helpful comments and suggestions. Any errors are our own.

## 1.1 Exclamatives in embedded contexts

Factive predicates like *know* have been observed to embed *wh*-exclamatives (Kiparsky & Kiparsky 1970) (3).

- (3) Francine knows how very tall Maurice is.

This has often been attributed to the factivity of the exclamative clause, since exclamatives seem to be presuppositional (Grimshaw 1979, Abels 2010, a.m.o.):

- (4) How very tall Maurice is!  
*Presupposed:* Maurice is very tall

While factive predicates can uniformly embed exclamatives, certain non-factive predicates can also embed exclamatives<sup>1</sup>

- (5) a. Rhoda guessed how extremely boring the party was.  
 b. Verna visualized what a beautiful cake they would make.  
 c. Nigel conjectured what a terrible rainstorm we would have.  
 d. The linguist told me what an intriguing squib she wrote.

What the matrix predicates in (5) have in common with factives is their ability to take both declarative and interrogative complements; they are *responsive* in the terminology of Lahiri (2002).

**This talk:** we will propose the following empirical generalization, which to our knowledge is novel:

- (6) EMBEDDED EXCLAMATIVE GENERALIZATION  
 A predicate *V* can take *wh*-exclamative complements iff *V* is ***wh-responsive***, i.e. it can take declarative complements and *wh*-interrogative complements.

We also argue that this generalization can be derived via two independently-motivated theoretical assumptions:

1. Exclamatives denote questions (sets of propositions) which presuppose a particular answer, à la Zanuttini & Portner (2003)
2. Responsive predicates s-select for questions (Uegaki, 2016; Theiler et al., 2018, a.o.)

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<sup>1</sup>Abels (2010):10 provides another counterexample to the factivity generalization:

- (i) (5) It would have done your heart good to have heard him assert what a valuable contribution to the cause your document is.

## 2 What embeds exclamatives

### 2.1 Embedded exclamatives are really exclamatives

Some have argued that apparent embedded exclamatives are embedded interrogatives in disguise, and ‘true’ embedded exclamatives are categorically ungrammatical (d’Avis, 2002; Sæbø, 2010; Rett, 2011, a.o.).

One reason: many *wh*-exclamatives in embedded contexts are syntactically indistinguishable from interrogatives because of the absence of subject-aux inversion.

But as Huddleston (1993) and others argue, embedded *how* ADJ-clauses are ambiguous between interrogative and exclamative readings:

- (7) *Context: These ruins are 1000 years old.*  
 I’m surprised how old these ruins are.  
**Interrogative reading:** I’m surprised that these ruins are 1000 years old  
**Exclamative reading:** I’m surprised that these ruins are 1000 years old and 1000 is above some high threshold for oldness  $\theta$

Moreover, *What an x* and *how*+intensifier clauses lack clear interrogative readings (8), yet they are nonetheless embeddable (9). Inversion exclamatives, however, are never embeddable in English.

- (8) a. \*What a big nose do you have?  
 b. ??How very dreadful is the weather today?
- (9) a. Lorelei was horrified [what a big nose you have].  
 b. The sentinel warned us [how very dreadful the weather is today].  
 c. \*Theophilus knows [are you in for a treat].

For this reason, we will only consider cases with *what an x* or *how very x* complements.<sup>2</sup>

### 2.2 Exclamative-embedding predicates

#### 2.2.1 The factive generalization

The ability to embed exclamatives has been linked to factivity (Elliott 1971, 1974, Grimshaw 1979).

- (10) a. It’s amazing what a fool Bill is.  
 b. Doris realized what a big mistake she had made.  
 c. It’s a pity what a small salary they earn.  
 (Adapted from Grimshaw 1979:318)

Grimshaw (1979) goes so far as to claim that nonfactive predicates can’t embed exclamatives at all (11).

<sup>2</sup>We will also set embeddability of inversion exclamatives aside as a topic for further study.

- (11) a. \*It's possible what a fool Bill is.  
 b. \*Doris thought what a big mistake she had made.  
 c. \*It seems what a small salary they earn.

### 2.2.2 The responsive generalization

While it is true that all factive predicates can embed exclamatives, this masks a larger generalization.

Verbs which embed only declaratives (12) or only interrogatives (13) do not embed exclamatives:

- (12) a. Mona thinks/believes/hopes that you have a palatial home.  
 b. \*Mona thinks/believes/hopes which palatial home is yours.  
 c. \*Mona thinks/believes/hopes what a palatial home you have.
- (13) a. Raquel wondered/asked/investigated which brand of creamed corn Morris liked.  
 b. \*Raquel wondered/asked/investigated that Morris liked creamed corn.  
 c. \*Raquel wondered/asked/investigated how very revolting creamed corn was.

However, all verbs which permit both declarative and interrogative complements—**responsive predicates**, following Lahiri (2002)—do allow embedded exclamatives.

Crucially, this includes all factive predicates (14) plus speech act verbs like *say* (15), as well as a handful of other verbs like *guess* (16).<sup>3</sup>

- (14) **Factive predicates** (*know, find out, be surprised, be happy...*)  
 a. Belinda found out that she was very patient.  
 b. Belinda found out where her boss's house was.  
 c. Belinda found out how incredibly patient she was.
- (15) **Speech act predicates** (*say, tell, shout...*)  
 a. Olivia said that Eli had lied.  
 b. Olivia said who had lied.  
 c. Olivia said what a shameless liar Eli was.
- (16) **Other predicates** (*guess, predict...*)  
 a. Naomi guessed that her opponent would be tough to beat.  
 b. Naomi guessed who her opponent would be.  
 c. Naomi guessed what a grueling tough match she was in for.

However, predicates can embed polar interrogatives but not *wh*-interrogatives, such as *doubt*, cannot embed exclamatives:

<sup>3</sup>This bears on a larger question of whether all responsive verbs are veridical with respect to interrogative complements, i.e. whether  $x V Q$  entails  $x V \text{that } P$  where  $P$  is an answer to  $Q$  as proposed by e.g. Spector & Egré (2015). The predicates in this talk seem to be veridical in this sense, though it remains to be seen whether predicates which have been proposed as counterexamples for Spector & Egré's generalization, such as Estonian *mõtlema* 'think' (Roberts, 2020), can also take exclamative complements.)

- (17) a. Beauregard doubted whether the plan would be a success.  
 b. \*Beauregard doubted which guests brought the best hors d'oeuvres.  
 c. \*Beauregard doubted what a tremendous soirée this was.

This leads us to the following generalization:<sup>4</sup>

- (18) EMBEDDED EXCLAMATIVE GENERALIZATION  
 A predicate *V* can take *wh*-exclamative complements iff *V* is **wh-responsive**, i.e. it can take declarative complements and *wh*-interrogative complements.

The reverse—that if a predicate is *wh*-responsive, it can embed exclamatives, also appears true.

## 2.3 What embedded exclamatives mean

The judgment of exceptionality in exclamatives must be linked to some perspective holder. What happens for embedded exclamatives, for which there may be multiple possible perspective holders?

In non-negated contexts, the judgment of exceptionality seems to be necessarily associated with the speaker (19b) as well as the matrix attitude holder (19c).

- (19) a. Yesterday, Briony found out how very tall Horatio is. This morning, she and I marveled at his height.  
 b. #Yesterday, Briony found out how very tall Horatio is. I completely disagree with her, though. She's so short, she thinks anyone over 5'5" is tall.  
 c. #Yesterday, Briony found out how very tall Horatio is. She disagrees with me, though. She's so tall herself, she think he's merely of average height.

If these predicates are negated, the judgment of exceptionality is still attributed to the speaker, but not the attitude holder.

- (20) Bernadette: Henrietta doesn't know what a glorious flower garden you have.  
 ⊢ Bernadette believes the flower garden is glorious.  
 ≠ Henrietta believes the flower garden is glorious.

Thus, it seems like in positive contexts, both speaker and attitude holder must be surprised about the content of the exclamative, but in negative contexts, only the former must.<sup>5</sup>

<sup>4</sup>A potential counterexample to this generalization, as Gutiérrez-Rexach & Andueza (2017) note for Spanish, is that some directive perception verbs like *look* in the imperative form can embed exclamatives as well:

- (i) Look what a mess you made!

It is clear there is something interesting here, since *look* does not ordinarily permit clausal complements at all in the indicative form; we leave these cases aside for the moment.

<sup>5</sup>The picture may be more complicated for speech act verbs. When exclamatives are embedded under speech act verbs, some English speakers can attribute the exceptionality judgment to the attitude holder only, not the speaker (i).

- (i) At tea yesterday, Briony said how very tall Hortense's husband is. I completely disagree with her, though. I met the man last week myself. The thing is, Briony is so short, she thinks everyone over 5'5" is tall.

### 3 Proposal

#### 3.1 The denotation of exclamatives

Our proposal takes inspiration from Zanuttini & Portner’s (2003) analysis, in which *wh*-exclamatives are, in effect, factive questions.

Z&P’s original proposal is that exclamatives contain left-peripheral *wh* and factivity operators, each occupying their own CP layer (21).

- (21) a. How very tall Winifred is!  
 b. [[How very tall]<sub>WH</sub> [FACT [Winifred is *d*-tall]]]

The associated exclamative force, i.e., the surprise, is derived from the resulting denotation by the pragmatic process of WIDENING.

For a *wh*-exclamative, widening means expanding the initial domain of quantification for the *wh*-operator to contain at least one additional ‘extreme’ proposition of the same form as the propositions in the original domain.

We propose a single left-periphery operator, EXCL, defined as follows, where  $ans_1$  applied to a question returns the maximal true answer to that question (Heim, 1994):

$$(22) \quad \llbracket \text{EXCL} \rrbracket^{w,c} = \lambda q_{\langle st,t \rangle} : \exists p[p = ans_1(q_{c^+})(w) \wedge p \notin q_c \wedge p(w) = 1] \cdot \{p : p = ans_1(q_{c^+})(w) \wedge p \notin q_c \wedge p(w) = 1\}$$

Here,  $q_c$  denotes  $q$  evaluated in context  $c$ , and  $q_{c^+}$  is the set denoted by  $q$  in a ‘widened’ context  $c^+$  such that  $q_{c^+}$  has the following properties:<sup>6</sup>

- $q_c \cap q_{c^+} = q_c$  and  $q_{c^+} - q_c \neq \emptyset$
- $\forall p \in q_c [\forall p' \in (q_{c^+} - q_c) [p' \rightarrow p]]$  (cf. Z&P: (32))<sup>7</sup>

When EXCL is applied to a question  $q$ , it returns the set containing a maximal answer to a domain-widened  $q$ , and presupposes such an answer to exist and be true.

The presupposition here imposes a widening requirement that the maximal answer to  $q_{c^+}$  is not in  $q_c$ , inspired by proposals for NPIs and adjectives (Kadmon & Landman, 1993; Morzycki, 2012)

The ‘surprisal’ associated with exclamatives arises pragmatically, as in Z&P’s account:

- The maximal true answer to  $q_{c^+}$  is outside the contextually restricted domain of  $q$  in the conversational context  $c$ , but this answer’s existence is nonetheless presupposed

In such cases, it seems the exclamative is interpreted as a kind of *de dicto* speech act; we leave these cases for further investigation.

<sup>6</sup>We assume the contextual restriction of  $q_c$  to be determined by the same general mechanism one would use to contextually restrict the domain of an interrogative in the same discourse situation.

<sup>7</sup>While we formulate this in terms of asymmetric entailment, an analysis in terms of degrees is also viable.

- This means that the true answer to  $q$  requires the domain of  $wh$ -quantification to be outside the ‘normal’ domain given the restrictions of  $chis$  amounts to a restriction on the widening of the domain of  $wh$ -quantification,

### 3.2 The denotation of responsive predicates

Responsive predicates have long been assumed to select for propositions, and can compose with type-shifted interrogative clauses (e.g. Karttunen, 1977; Heim, 1994; Spector & Egré, 2015)

We follow recent work in assuming that responsive predicates underlyingly  $s$ -select for questions (Uegaki, 2016; Elliott et al., 2017; Theiler et al., 2018; Roberts, 2020).

Formally, a responsive predicate like *say* selects for a question (a set of propositions) and contributes existential quantification over propositions as follows:

$$(23) \quad \llbracket \text{say} \rrbracket^w = \lambda q \lambda x. \exists p \in q [\textbf{say}(p)(x)(w)]$$

*Say* can compose with an interrogative straightforwardly because interrogatives denote questions.

*Say* can also compose with declaratives which are type-shifted into singleton questions, under Uegaki’s account, using the ID, inspired by Partee (1986):

$$(24) \quad \llbracket \text{ID} \rrbracket = \lambda q. p = q$$

Crucially, we assume there is a unified denotation for both declarative and interrogative-embedding versions of a predicate.<sup>8</sup>

### 3.3 Composing embedded exclamatives

With these ingredients, we can derive the meaning of embedded  $wh$ -exclamatives.

- (25) a. Dolly said how very tall Winifred is.  
b. [Dolly said [EXCL [how very tall Winifred is]]]

Assuming that the context  $c$  provides that the range of plausible heights for Winifred are 5’9”, 5’10”, and 5’11”:

- (26) a.  $\llbracket \text{how very tall Winifred is} \rrbracket^{w,c} = \{\text{Winifred is 5’9”-tall, Winifred is 5’10”-tall, Winifred is 5’11”-tall}\} = q_c$   
b.  $\llbracket \text{EXCL} \rrbracket^{w,c} = \lambda q_{\langle st,t \rangle} : \exists p [p = \text{ans}_1(q_{c+})(w) \wedge p \notin q_c \wedge p(w) = 1]. \{p : p = \text{ans}_1(q_{c+})(w) \wedge p \notin q_c \wedge p(w) = 1\}$

In order for (25a) to be felicitously uttered, Winifred’s true height must be above 5’11”. Assuming her true height is 6’1”,  $q_{c+}$  must therefore contain the proposition that Winifred is 6’1”:

<sup>8</sup>There is of course more to the story for *say*, since *say Q* does not mean ‘say any answer to Q’, but something more like ‘say the true answer to Q’ (Spector & Egré, 2015). This oversimplification will not play a significant role here, since we assume that factivity of exclamatives comes from the embedded clause itself.

- (27)  $\llbracket \text{how very tall Winifred is} \rrbracket^{w,c^+} = \{\text{Winifred is 5'9''-tall, Winifred is 5'10''-tall, Winifred is 5'11''-tall, Winifred is 6'0''-tall, Winifred is 6'1''-tall}\} = q_{c^+}$

With this in hand, we can now evaluate the embedded clause of (25a) by applying EXCL:

- (28) a.  $\llbracket \text{EXCL[how very tall Winifred is]} \rrbracket^{w,c} = \exists p[p = \text{Winifred is 6'1'' tall} \wedge \text{Winifred is 6'1'' tall} \notin q_c \wedge \text{Winifred is 6'1'' tall in } w]. \{\text{Winifred is 6'1''-tall}\}$   
 b.  $\llbracket \text{Dolly said [EXCL[how very tall Winifred is]} \rrbracket^{w,c} = \exists p[p = \text{Winifred is 6'1'' tall} \wedge \text{Winifred is 6'1'' tall} \notin q_c \wedge \text{Winifred is 6'1'' tall in } w]. \exists p \in \{\text{Winifred is 6'1''-tall}\} [\text{say}(p)(d)(w)]$   
 $= \exists p[p = \text{Winifred is 6'1'' tall} \wedge \text{Winifred is 6'1'' tall} \notin q_c \wedge \text{Winifred is 6'1'' tall in } w]. \text{say}(\text{Winifred is 6'1''-tall})(d)(w)$

This amounts to a claim that Dolly said that Winifred is 6'1'', presupposes both that Winifred is in fact 6'1'' and that this height is outside the normal range of heights.

### 3.4 What about other question-embedders?

If exclamatives are questions, we need to explain why predicates which embed only interrogatives, e.g. *wonder*, can't take exclamatives:

- (29) \*Llewellyn wonders/asks/investigates what a lovely day it is.

We propose, after Uegaki (2016) and Theiler et al. (2018), that this can be attributed to the lexical semantics of such predicates.

Specifically, interrogative-only embedders like *wonder* presuppose that the attitude holder believes both true and false answers to the embedded interrogative are possible (i.e. the question is 'non-trivial'):

- (30)  $\llbracket \text{wonder} \rrbracket(Q)(x)$  is defined only if the following proposition is compatible with  $x$ 's beliefs:  
 $\lambda w. \exists p \in Q[p(w)] \wedge \exists p \in Q[\neg p(w)]$  (Uegaki 2016: 647)

If we assume that embedded presuppositions must be satisfied by the beliefs of the attitude holder (Karttunen, 1973; Heim, 1992, a.m.o.), (30) derives the badness of *wonder*+exclamative.

Embedded exclamatives denote singleton questions, rendering the presupposition of (30) impossible to satisfy and resulting in a trivial meaning for sentences like (29).

## 4 Alternative theories of exclamatives

We consider here three main alternative semantic treatments of exclamatives, and suggest that they do not easily derive the embedded exclamative generalization.



## 4.1 Illocutionary force operators

Some analyses of exclamatives center on their illocutionary force, e.g. using a ForceP with certain feature-checking requirements (Gutiérrez-Rexach 2008, Rett, 2008, 2011).

A problem for this view: It's not designed for embedded exclamatives. If exclamatives must have the illocutionary force operator for exclamation, they are presumably never embeddable.

## 4.2 Degree predicates

Rett also fundamentally treats *wh*-exclamatives as **properties of degrees**:

- (31)  $\llbracket \text{what delicious desserts Meryl baked} \rrbracket = \lambda d. \exists x [\text{baked}'(m, x) \wedge \text{desserts}'(x) \wedge \text{delicious}'(x, d)]$   
(Rett 2011: 29)

This is chiefly motivated by two observations: 1) that exclamatives are evaluative, and 2) only *wh*-words with degree readings occur in *wh*-exclamatives:

- (32) a. What fun it is to ride in a one-horse open sleigh!  
b. How tired of Zoom calls I am!  
c. \*Who you run into these days!  
d. \*Where I left my muskrats!  
e. \*When I eloped to Saskatchewan!  
f. \*Why they'll never find the evidence!

While Rett's account assumes an illocutionary force operator, we could imagine a version of Rett's account which does not do this, yet maintains the degree property semantics.

This would be difficult to reconcile with our facts for three reasons: first, clausal-embedding predicates clearly don't embed other predicates of degrees more generally.

Second, as Rett herself notes, the degree property analysis doesn't straightforwardly account for inversion exclamatives that lack anything overtly gradable.<sup>9</sup>

Third, the observation in (32) is not universal. Some *wh*-exclamatives in non-English languages involve non-degree *wh*-phrases:

- (33) **Dutch**  
Wie ik net op straat tegenkwam!  
who I just on street encountered  
'Who I just encountered on the street!' (Nouwen & Chernilovskaya 2013:8)
- (34) **Turkish**  
Vay, anne-m ne piş-ir-miş!  
wow mother-my what cook-PASS.PTCP-INFER.3SG

<sup>9</sup>This is, of course, a problem for nearly all semantic accounts of exclamatives, including the present approach.

‘Wow, the stuff my mom cooked!’ (Lit. ‘Wow, what my mom cooked!’) (Zevakhina 2016:28)

If the embedded clauses in (33) and (34) do have degree interpretations after all, we additionally need a story for how those readings arise.

### 4.3 Propositions or facts

Castroviejo Miró (2006) proposes that exclamatives denote *facts*, a type of object ontologically distinct from propositions and questions (following Ginzburg & Sag 2000)

This is intuitively appealing, given that exclamatives seem to presuppose truth of a particular proposition, but causes trouble in embedded clauses.

For G&S, there is a many-to-many mapping of clause types to semantic objects.

→ While exclamative clauses *must* denote facts, declaratives and interrogatives *can* denote facts.

Because exclamatives are fact-denoting, any predicate which takes exclamatives should (in principle) allow for declarative and interrogative complements as well.

This correctly predicts that exclamative-embedders are all responsive, though not vice versa, contra our generalization.

Simply put, we don’t want to have non-factive predicates select for facts *per se*. Some predicates which take exclamatives can be modified with antifactive adverbs, for instance:

- (35) a. Umberto incorrectly guessed that the money was in Safe #72.  
b. The undertaker falsely stated that he was nowhere near the scene of the crime.

This could be reconciled by allowing predicates like *guess* to take propositions **or** facts, as G&S do, but it is not clear what additional empirical or theoretical advantage this offers above our account.

## 5 Conclusion

Our empirical claims:

- *Wh*-exclamatives are truly embeddable, according with Grimshaw (1979), Zanuttini & Portner (2003), Abels (2010), a.m.o, and contra d’Avis (2002), Rett (2011), a.o.
- EMBEDDED EXCLAMATIVE GENERALIZATION: A predicate can take *wh*-exclamative complements iff it is (*wh*-)responsive.

Our theoretical claim is that the EEG can be derived by making two independently motivated assumptions:

- Exclamatives denote ‘factive questions’, as in Zanuttini & Portner (2003)
- Responsive predicates select for questions, not propositions.

Some open questions:

- Can we derive the unembeddability of inversion exclamatives?
- Does the responsive generalization hold cross-linguistically? If not, what is the locus of variation?
- Where does the degree interpretation of exclamatives come from?

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